We claim:

1. A method for modeling knitwear comprising:

generating a macrostructure for a three-dimensional object, based on at least a stitch pattern;

generating a yarn microstructure; and,

applying the yarn microstructure to the macrostructure to yield a knitwear model.

2. The method of claim 1, wherein generating the macrostructure is further based on a color pattern.

3. The method of claim 1, wherein generating the macrostructure comprises applying the stitch pattern to surfaces of the three-dimensional object.

4. The method of claim 1, wherein generating the macrostructure is further based on a color pattern, and comprises applying the stitch and the color patterns to surfaces of the three-dimensional object.

5. The method of claim 1, wherein generating the macrostructure comprises:

parameterizing a two-dimensional surface partitioned into quadrilaterals and corresponding to the stitch pattern to a three-dimensional surface partitioned into curved quadrilaterals, in accordance with the three-dimensional object;

for each curved quadrilateral of the three-dimensional surface, connecting a plurality

of key points of the curved quadrilateral with curved segments to yield a stitch loop, the three-dimensional surface resulting in the macrostructure.

6. The method of claim 5, wherein generating the macrostructure is further based on a color pattern, and further comprises, for each curved quadrilateral of the three-dimensional surface, applying a color from the color pattern.

7. The method of claim 5, wherein each quadrilateral of the two-dimensional surface comprises a rectangle, and each curved quadrilateral of the three-dimensional surface comprises a curved rectangle.

8. The method of claim 1, further comprising, prior to generating the yarn microstructure, introducing irregularities in stitch positions of the macrostructure.

9. The method of claim 8, wherein introducing the irregularities in the stitch positions of the macrostructure comprises:

perturbing non-corner stitch positions of the two-dimensional surface until equilibrium is reached; and,

parameterizing the non-corner stitch positions of the two-dimensional surface to corresponding non-corner stitch positions of the three-dimensional surface.

10. The method of claim 1, wherein generating the yarn microstructure comprises:

bounding each of a plurality of segments of a triangulated cylinder surface of the yarn microstructure with a first discretized loop and a second discretized loop; and,

discretizing each segment of the cylinder surface into triangles, each triangle having vertices located on the first and the second discretized loops.

11. The method of claim 10, wherein generating the yarn microstructure further comprises perturbing one of the vertices of each triangle to increase fluffiness of the yarn microstructure.

12. The method of claim 1, wherein applying the yarn microstructure to the macrostructure to yield the knitwear model comprises:

for each stitch of a plurality of stitches of the macrostructure,

for each curved segment of a plurality of curved segments of the stitch,

applying the yarn microstructure to the curved segment.

13. A machine-readable medium having instructions stored thereon for execution by a processor to perform a method for modeling knitwear comprising:

parameterizing a two-dimensional surface partitioned into quadrilaterals and corresponding to a stitch pattern to a three-dimensional surface partitioned into curved quadrilaterals, in accordance with a three-dimensional object;

for each curved quadrilateral of the three-dimensional surface, connecting a plurality of key points of the curved quadrilateral with curved segments to yield a stitch loop, a stitch of the curved quadrilateral comprising the stitch loop, the three-dimensional surface resulting in a macrostructure;

bounding each of a plurality of segments of a triangulated cylinder surface with a first discretized loop and a second discretized loop;

discretizing each segment of the cylinder surface into triangles, each triangle having vertices located on the first and the second discretized loops, the cylinder surface resulting in a yarn microstructure;

for each curved segment of each stitch of the macrostructure, applying the yarn microstructure to the curved segment, the macrostructure resulting in a knitwear model.

14. The medium of claim 13, wherein the two-dimensional surface further corresponds to a color pattern.

15. The medium of claim 13, wherein the method further comprises, prior to bounding each of the plurality of segments of the triangulated cylinder surface,

perturbing non-corner stitch positions of the two-dimensional surface until equilibrium is reached; and,

parameterizing the non-corner stitch positions of the two-dimensional surface to corresponding non-corner stitch positions of the three-dimensional surface, the three-dimensional surface resulting in a surface having irregular stitch positions.

16. The medium of claim 13, wherein the method further comprises, subsequent to discretizing each segment of the cylinder surface into triangles, perturbing one of the vertices of each triangle to increase fluffiness of the yarn microstructure.

17. A method comprising:

generating a pre-knitwear texture, based on at least a stitch pattern;

generating a yarn microstructure; and,

applying the yarn microstructure to the pre-knitwear texture to yield a two-dimensional knitwear texture.

18. The method of claim 17, further comprising mapping the two-dimensional knitwear texture to a three-dimensional object to yield a knitwear model.

19. The method of claim 17, wherein generating the pre-knitwear texture is further based on a color pattern.

20. The method of claim 17, wherein generating the pre-knitwear texture comprises applying the stitch pattern to a two-dimensional surface.

21. The method of claim 17, wherein generating the pre-knitwear texture is further based on a color pattern, and comprises applying the stitch and the color patterns to the two-dimensional surface.

22. The method of claim 17, wherein generating the pre-knitwear texture comprises, for each of a plurality of quadrilaterals into which a two-dimensional surface is partitioned, connecting a plurality of key points of the quadrilateral with curved segments to yield a stitch loop, the two-dimensional surface resulting in the pre-knitwear texture.

23. The method of claim 22, wherein generating the pre-knitwear texture is further based on a color pattern, and further comprises, for each quadrilateral of the two-dimensional surface, applying a color from the color pattern.

24. The method of claim 22, wherein each quadrilateral of the two-dimensional surface comprises a rectangle.

25. The method of claim 17, further comprising, prior to generating the yarn microstructure, introducing irregularities in stitch positions of the pre-knitwear texture.

26. The method of claim 25, wherein introducing the irregularities in the stitch positions of the pre-knitwear texture comprises perturbing non-corner stitch positions of the two-dimensional surface until equilibrium is reached.

27. The method of claim 17, wherein generating the yarn microstructure comprises:

bounding each of a plurality of segments of a triangulated cylinder surface of the yarn microstructure with a first discretized loop and a second discretized loop; and,

discretizing each segment of the cylinder surface into triangles, each triangle having vertices located on the first and the second discretized loops.

28. The method of claim 27, wherein generating the yarn microstructure further comprises perturbing one of the vertices of each triangle to increase fluffiness of the yarn microstructure.

29. The method of claim 17, wherein applying the yarn microstructure to the pre-knitwear texture to yield the two-dimensional knitwear texture comprises:

for each stitch of a plurality of stitches of the pre-knitwear texture,

for each curved segment of a plurality of curved segments of the stitch,

applying the yarn microstructure to the curved segment.

30. A machine-readable medium having instructions stored thereon for execution by a processor to perform a method comprising:

for each of a plurality of quadrilaterals into which a two-dimensional surface corresponding to a stitch pattern is partitioned, connecting a plurality of key points of the quadrilateral with curved segments to yield a stitch loop, a stitch of the quadrilateral comprising the stitch loop, the two-dimensional surface resulting in a pre-knitwear texture;

bounding each of a plurality of segments of a triangulated cylinder surface with a first discretized loop and a second discretized loop;

discretizing each segment of the cylinder surface into triangles, each triangle having vertices located on the first and the second discretized loops, the cylinder surface resulting in a yarn microstructure; and,

for each curved segment of each stitch of the pre-knitwear texture, applying the microstructure to the curved segment, the pre-knitwear texture resulting in a two-dimensional knitwear texture.

31. The medium of claim 30, the method further comprising mapping the two-dimensional knitwear texture to a three-dimensional object to yield a knitwear model.

32. The medium of claim 30, wherein the two-dimensional surface further corresponds to a color pattern.

33. The medium of claim 30, wherein the method further comprises, prior to bounding each of the plurality of segments of the triangulated cylinder surface, perturbing non-corner stitch positions of the two-dimensional surface until equilibrium is reached, the two-dimensional surface resulting in a surface having irregular stitch positions.

34. The medium of claim 30, wherein the method further comprises, subsequent to discretizing each segment of the cylinder surface into triangles, perturbing one of the vertices of each triangle to increase fluffiness of the yarn microstructure.